Foundation

HWY FORM 700-008 REVISED 3/72

DEPARTMENT OF HIGHWAYS

INTRA-DEPARTMENTAL COMMUNICATION

DATE: April 14, 1976

FROM: R. V. LeClerc/A. J. Peters RVL/AJP
234-7110

SUBJECT: SOIL SAMPLING AT EDMONDS AND KINGSTON FERRY TERMINALS

TO: Don B. Rennie 576-7820
Division of Toll Facilities
Seattle Ferry Terminal Pier 52
Seattle, Washington 98104

We have recently completed the subsurface soil testing at the subject locations. As you will note, the test holes are not exactly in the position that you had indicated; however, we feel that they adequately represent the material at the two terminal sites.

Material found was not solid bedrock but consisted of very hard fine grained sedimentary material of glacial origin. On the Kingston side, only 5 to 7 ft of loose sand covered the underlying very hard silts and sands. As can be seen from the test boring logs, the standard penetration tests resulted in over 100 blows per foot of penetration. The Edmonds side was found to be a little different in that 14 to 17 feet of sand was overlying a layer of glacial till. Under the till very minor amounts of hard peat were found mixed with the very hard fine grained sands and silts similar to those found on the Kingston side.

Since the two sites have somewhat different foundation conditions, and the worst is the Kingston site, the majority of our comments are directed to that site. It appears there are two significant problems in developing a properly functioning pile dolphin. They are sufficient pile embedment to overcome uplift and adequate flexibility in the group to handle the impact loads. Obviously, these requirements are somewhat at odds with one another since adequate penetration to prevent the pile group from floating will probably result in pile fixity. Ideally, the piles should be embedded in very loose sand 10 to 20 ft to achieve both ends.

Neither of the sites has this type of foundation. The Edmonds site has lower blow count material overlying the glacial material; however, these sands are in the range of 20 blows per foot, certainly not loose. The Kingston site has 5 to 7 ft of loose sand overlying the glacial material which appears to be insufficient to provide either the desired lateral or uplift resistance.

Pile penetration can be increased by means of pile tips, preboring, jetting or through the use of composite piles. Obviously the flexibility of the pile dolphin will be reduced by fixing the bottom of the piles by driving into the very dense glacial material. Preboring oversize or jetting could reduce this problem somewhat by loosening the material immediately around the pile. Jetting appears to offer the greatest possibility since a greater amount of material could be loosene Itshould, however, be recognized that with increased penetration, even in fairly loose material, pile fixity will be developed within 10 to 20 ft of penetration.

It appears to us that these two sites are not well suited to the use of timber pile dolphins. We suggest alternate solutions be examined so that when future problems develop a better solution can be available. We will be pleased to aid in any way possible.

RVL:blg
AJP

Attach. 1) Test hole logs
2) Sketch showing hole locations

cc: A. D. Andreas

DEPARTMENT OF HIGHWAYS

INTRA-DEPARTMENTAL COMMUNICATION

DATE: February 2, 1976

FROM: R.V. LeClerc/T.V. Zimmerman
234-4660

SUBJECT: SOIL SAMPLING AT EDMONDS AND KINGSTON FERRY TERMINALS

TO: D. B. Rennie
Division of Toll Facilities

In reply to your request for subsurface information in the above areas, we would be pleased to provide the needed assistance. However, due to previously scheduled work, we find that it will be about the middle of March before we will have personnel and equipment available. We estimate that it will take from 17 to 20 working days to complete the four test holes that you have indicated. Since we have no way of knowing how deep the holes will be, we have estimated on the high side. In addition, for jobs such as these, mobilization costs will be a large part of the total cost, so scheduling both jobs for the same time will prove to be the most economical. For purposes of estimating the job cost you can assume our costs at $400 per day for men and equipment.

If this is satisfactory to your needs, please let us know and we will then schedule your work for March, 1976.

RVL:blg
TVZ